CASE REPORT PEER REVIEWED | OPEN ACCESS

When the plan "A" does not work, there is an "O" in the alphabet: Orthotopic kidney transplant. A case report

Josue Olivares del Moral, Alfonso Vega Sanchez, Michel Cedillo Monreal, Carlos Florez Zorrilla, Gandhi Thomas Fonseca

ABSTRACT

Introduction: The prolonged wait for an organ can lead to depletion of vascular access in patients with chronic kidney disease. The lack of suitable vessels forces surgeons to explore alternative approaches for renal graft anastomosis, such as the orthotopic transplant procedure. The aim of this article is to present a case of a patient with exhaustion of vascular access and urgent need for kidney transplantation, which was successfully performed using orthotopic technique.

Case Report: A 33-year-old man with stenosis of the iliac arteries underwent an orthotopic transplant with placement of the graft to the splenic vessels and pyelo-ureteral anastomosis. The patient had a very successful evolution and normal graft function.

Conclusion: As surgical techniques evolve, increasingly complex patients require advanced, individualized approaches. This case exemplifies the multidisciplinary planning and execution needed to meet the growing challenges in transplantation. The report underscores the importance of innovative surgical strategies and comprehensive transplant protocols to address the future demands of the transplant community.

Keywords: Kidney allograft, Kidney transplantation, Orthotopic transplant

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INTRODUCTION

Worldwide, according to data from the organ procurement and transplantation network (OPTN) the median time for a kidney transplant is 4.05–5.19 years [1]. This prolonged wait for an organ can lead to depletion of vascular access in recipients. Central venous stenosis has been reported in up to 51% of these patients, complicating the surgical technique, especially when the iliac vessels are affected [2]. The lack of suitable vessels forces surgeons to explore alternative approaches for renal graft anastomosis, such as the orthotopic transplant procedure.

This technique has been used occasionally since 1950 by Lawler who performed it for the first time. Years later it was described by Gil-Vernet in 1978, these series of cases included young patients with atheromatosis or vascular abnormality [3, 4].

The main indications for orthotopic renal transplantation (ORT) have historically included severe atherosclerosis or bilateral iliac vessel stenosis [5]. Another emerging indication involves patients with low-grade and stage renal cell carcinoma where native nephrectomy followed by immediate transplantation can be performed, as a new approach recommended in the evolving field of oncology [6].

The aim of this article is to present a case of a patient with exhaustion of vascular access and urgent need for kidney transplantation, which was successfully performed using orthotopic technique. This involved vascular anastomosis to the splenic artery and vein, as well as ureteropyelostomy.

CASE REPORT

A 33-year-old man with end stage kidney disease on renal replacement therapy since the age of 21 was referred to nephrology department. He had been on peritoneal dialysis for one year, but then switched to hemodialysis at the age of 22 years because of peritonitis. Throughout follow-up he required 12 vascular accesses, with the last hemodialysis catheter placed in the vena cava which began malfunctioning within the first month. A catheter-related infection was identified and treatment was initiated.

During the pre-surgical workup, a non-contrast computed tomography (CT) scan revealed stenosis in the vascular lumen of the iliac arteries and significant calcification. Angiotomography confirmed the absence of contrast below the cava cava catheter insertion site, requiring an alternative surgical plan for the patient's first graft. The donor was his 25-year-old brother, immunosuppressive induction therapy was performed with basiliximab and steroids. On the day of surgery, the patient's urea level was 92 mg/dL and creatinine level was 9.6 mg/dL.

The surgical approach involved a midline laparotomy to identify the native kidney and explore options for vascular anastomosis to the patient's renal vessels. However, a hypotrophic kidney was identified as anticipated from imaging, leading to the dissection of the splenic and suprapancreatic vessels. Due to their tortuous path, a splenectomy was performed, and an end-to-end splenorenal anastomosis of the artery and vein was executed, achieving immediate and robust reperfusion (Figure 1B and C). The ureter was anastomosed to the native renal pelvis with the placement of a double-J catheter for drainage (Figure 1A). Intraoperatively, the warm ischemia time was 3 minutes, cold ischemia was 148 minutes, and blood loss was approximately 900 cc, necessitating one unit of packed red blood cells. In the immediate post-operative period, the patient exhibited spontaneous diuresis with a volume of 5200 cc within the first 24 hours and a creatinine decrease to 2.45 mg/dL. On post-operative day 4, a renal scan with mercaptoacetyltriglycine (MAG-3) demonstrated a clearance of 87.5 mL/min/1.73 m², with a grade 1 curve (normal perfusion and reduced excretion).

Three months post-transplant, a protocol biopsy showed normal findings with no signs of rejection. A follow-up MAG-3 scan revealed a clearance of 295 mL/min/1.73 m² with a grade 0 curve (normal perfusion and normal excretion). The patient's creatinine stabilized at 1.3 mg/dL, with a glomerular filtration rate (GFR) of 74 mL/min/1.73 m². He resumed work and continued triple immunosuppressive therapy, and his overall recovery has been favorable (Table 1).

DISCUSSION

Heterotopic renal transplantation is indicated in special cases such as this one, where vascular depletion and iliac vessel stenosis demanded us an individualized surgical approach to identify the best available vessels for anastomosis.

Splenic vessel anastomosis has been previously described in similar cases. Marinov et al. published a case of a patient with infrarenal inferior vena cava thrombosis

Table 1: Clinical and biochemical evolution after kidney transplant

	Baseline	Day 1	Day 5	Day 30	Day 90	Day 365
Hemoglobin (g/dL)	10.3	7.1	9.4	13.2	16.1	16
Urea (mg/dL)	92	85	49	43	42	56
Creatinine (mg/dL)	9.6	2.4	1.4	1.1	1.04	1.2
Cystatine C (mg/dL)	–	2.8	2.4	–	1.3	1.3
Amylase (mg/dL)	64	10,700	261	89	–	–
Lipase (mg/dL)	25	84.1	46	28	–	–
Tacrolimus (ng/mL)	2.5	–	9.0	9.1	12.1	10.3
Parathormone (pg/mL)	262	–	–	30.6	60.4	73
Albumin (g/dL)	2.3	2.1	2.3	3.9	5.3	4.7

Abbreviations: g, gram; mg, milligram; dL, deciliter; ng, nanogram; pg, picogram.

Table 2: Surgical techniques reported for orthotopic renal transplantation

	Arterial anastomosis	Venous anastomosis	Urinary reconstruction	Complications	Kidney function
Case report, 2024	Native splenic artery	Native splenic vein	Pyelo-ureteral	Bleeding 900 cc	74 mL/min/1.73 m²
Artiles Medina et al., 2022 [10]	Native splenic artery	Native splenic vein or renal vein	Pyelo-pyelic	None	46 mL/min/1.73 m²
Parmentier-de León, 2019 [11]	Native aorta artery	Native renal vein	Uretero-ureteral	Not reported	Not reported
Marinov, 2005 [7]	Native splenic artery	Native splenic vein	Uretero-ureteral	Not reported	Not reported

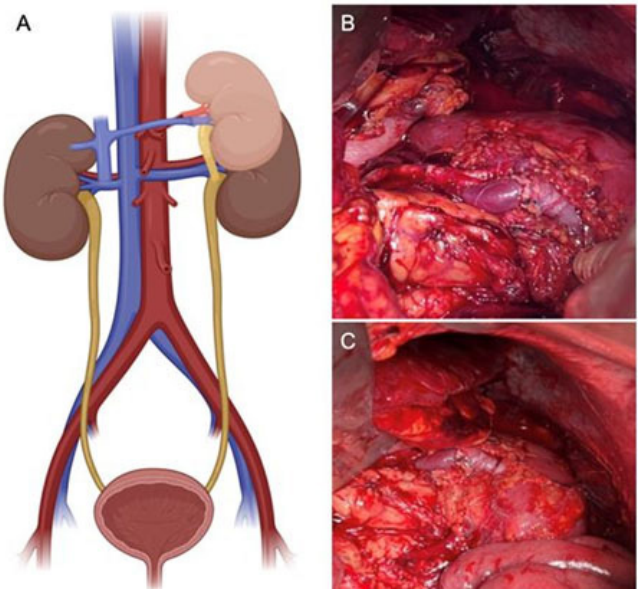

Figure 1: Representative diagram of the position and anastomosis of the renal graft (A). Photograph of the graft showing arterial and venous anastomosis to native splenic arteries (B and C).

and ABO-incompatible kidney transplantation [7]. Their approach involved splenectomy with end-to-end anastomosis of the renal graft vessels to the splenic vessels. The left native ureter was then divided distal to the pelvis and anastomosed terminally to the transplant ureter [7]. In this case, the choice to use the splenic vessels seemed the most logical due to the need for splenectomy in the presence of an ABO-incompatible donor and the lack of access to adequate systemic or mesenteric venous drainage due to thrombosis and previous surgery, in contrast to our patient, who had high donor compatibility (one haplotype, same ABO group, and a negative cross-match), their case involved significant incompatibility, which influenced the decision to use splenic vessels.

The survival rate following orthotopic transplantation has been reported at 92%, with functional graft survival of 88% [8]. These outcomes are remarkable, given the complex nature of patients considered for this procedure.

Like any surgical intervention, orthotopic transplantation carries risk. Vascular and urinary complications occur in approximately 19% of cases, with arterial stenosis and vascular thrombosis being the most common, occurring in 10% and 6% of cases, respectively [8].

Urological complications are less common, due to new techniques and the use of double-J catheters, but urinary fistulas and obstruction still persist as the main complications [9].

Artiles Medina et al. reported higher complication rates, with early post-operative complications in 66% of cases, a one-year survival rate of 87%, and a graft loss rate of 42% at six years [10]. Fortunately, our patient did not experience any surgical complications during the observation period. The intracaval catheter was safely removed five days after the transplant.

Benefits of orthotopic technique have also been reported, including a lower incidence of vesicoureteral reflux and a reduction in the risk of erectile dysfunction, as it avoids the hypogastric arteries [5].

Another case reported from Mexico by Parmentier et al. described a patient with exhaustion of angioaccess (recurrent infections, femoral thrombosis, and superior vena cava stenosis) who underwent an orthotopic transplant with placement of the graft in the left native kidney site, performing anastomosis of the renal artery to the aorta, renal vein of the graft to the native renal vein, and ureter to native ureter with double-J catheter, with no significant alteration in renal function and with a normal protocol biopsy at the third month [11].

Sites of anastomosis may vary. Artiles Medina et al. report 21 cases of orthotopic renal transplants, where the donor arterial anastomosis was performed to the native splenic artery in 95% of cases, and to the aorta in 5%. The donor venous anastomosis was performed to the native renal vein in 85.7% of cases, to the native splenic vein in 9.52%; and to the inferior vena cava in 4.7% (Table 2) [10]. Urinary reconstruction was performed by uretero-ureterostomy in 14 patients, pyelo-pyelostomy in 6 patients, and ureteral implantation in the ileal conduit in 1 patient. In this report, pyelo-ureterostomies were not performed, which is the case in our patient [10].

CONCLUSION

Kidney transplantation remains the gold standard for treating end-stage renal disease. As surgical techniques evolve, increasingly complex patients require advanced, individualized approaches. This case exemplifies the multidisciplinary planning and execution needed to meet the growing challenges in transplantation. The report underscores the importance of innovative surgical strategies and comprehensive transplant protocols to address the future demands of the transplant community.

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ABOUT THE AUTHORS

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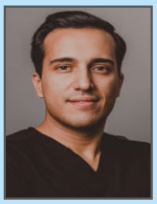

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